

## NOTES ON THE BREEDING BIOLOGY OF THE LONG-LEGGED BUZZARD (*Buteo rufinus*) IN BULGARIA

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**ABSTRACT.**—Observations were made on Long-legged Buzzard (*Buteo rufinus*) nests in Bulgaria between 1978–83. Egg hatching interval was 29–44 hr. First nestling plumage color was dirty-white tinged beige, cere and legs yellow; iris color changed from sepia at hatching to brownish yellow-grey at fledging. Feathers were visible by two wk. Until two wk old, nestlings assumed a “frozen” posture on their bellies when alarmed. Nestlings fed unaided by the fourth wk. Fledging began by d 49. Adults were aggressive towards humans while young were downy, but aggression lessened as young got older.

The Long-legged Buzzard (*Buteo rufinus*) is one of Europe's least studied raptors. Little detailed information on the breeding cycle of the species is available in the literature, especially with regard to its nestlings (Dementiev and Gladkov 1954; Brown and Amadon 1968; Glutz et al. 1971; Harrison 1975; Cramp and Simmons 1980). Recently, Michev et al. (1984) reported 14 definite breeding records for Bulgaria and estimated the country's population to be around 50 pairs. Also reported were notes on nest sites, egg size, breeding season and food of the species.

Herein, I report new data from Bulgaria on development and morphology of young, including hatching interval, weight at hatching, coloration of iris, bill, cere and legs, and growth of down and feathering. I also report on the behavior of adults and young and on certain other aspects of Long-legged Buzzard breeding biology.

### STUDY AREA AND METHODS

Data were collected on the nesting of the Long-legged Buzzard from 1978–83 during visits to five more easily accessible nests. Four nests were in South Bulgaria and one in North Bulgaria. Three nests were visited episodically (except for the nests in Pekliuka area). Most observations of nestlings were made at cliff-nests of a pair breeding in the Pekliuka area near Slivnitza (Sofia district) during 1981–83. Dates of visits were as follows: 9 April, 3, 14 and 16 May, and 4 June 1981; 23 May and 13 June 1982; daily during the hatch (1–4 May) and weekly on 11, 18 and 25 May and 2 June, with visits also on 21 May, and 18 and 21 June 1983. Photographs were taken and specimens of vertebrate prey were collected from the nests for identification on each of the weekly visits. On 11 and 21 May 1983 the nest was watched from a distance of approximately 800 m to record arrival times of adults with food. On 4 June 1981 the nest was watched between 0930–1900 H from a hide situated 25 m away. More frequent visits to the nest were avoided. Time spent at the site was reduced to a minimum to avoid disturbance, as the species is included in the list of endangered European birds (Hudson 1975; Michev 1986).

The Pekliuka nest was situated on a small, limestone outcrop in a shallow valley surrounded by low hills with

open plains beyond. The area is grazed by sheep and cattle attended by herdsmen. The landscape is varied by scattered thorn scrub, streamside willows (*Salix* sp.), *Carpinus orientalis* and a small conifer plantation (*Pinus nigra*). Nearest arable ground is one km away. Climate is temperate continental; av. rainfall = 592.1 liter/m<sup>2</sup> (1981–84); altitude = 7–800 m.

### RESULTS

**The Nest.** Long-legged Buzzards used the same nest at Pekliuka in 1981, 1983, and (T. Michev, pers. comm.) 1984. A new nest, relatively slight in construction, was used in 1982 on the same cliff complex approximately 350 m from the old nest (Fig. 1). Each nest was 50–60 cm dia, and both were situated on small cliff ledges. The older nest was 33–46 cm deep, and the newer nest measured only 20 cm deep. Sticks measuring  $\leq 2.5$  cm composed the base of the nest, while those in the upper layers were smaller. The nest cups were  $\leq 10$  cm deep and were composed of soft, fibrous, woody materials. Within the nest cup was found a tuft of grass roots, parts of a paper napkin, and bits of rusty wire.

Based on plumage, at least one of the adults at the Pekliuka site was judged to be the same individual in all four yr. The bird was the slightly larger one in all pairings and was thus considered to be the female, although differences in size were minimal even when pairs perched close together.

**The Eggs.** A newly laid egg weighed 70.4 g and measured 63.7 × 46.2 mm. An addled egg found during the ringing of young on 13 June 1982 weighed 61.5 g and measured 60.3 × 47.5 mm.

**Hatching and Growth of Young.** On 1 May 1983 one adult buzzard brooded two young, already of different sizes and in first down, and two eggs. The situation was unchanged the following day at 1300 H and 1800 H. A third young was in the nest at 0900 H on 3 May, and a fourth nestling's bill was protruding from the eggshell at 1200 H on 4 May (Fig. 2). Part of the fourth nestling's head



Figure 1. Crag nest site of Long-legged Buzzards at Pekliuka (Sofia district).

emerged shortly after. On this basis, the hatching interval at this nest was 29–44 hr. On 4 May the three young weighed 96.1 g, 61.0 g, and 48.1 g and were aged four-plus d, three-plus d, and one-d old, respectively. The fourth young, with shell still attached, weighed 59.8 g. The iris color of the nestlings was blackish-brown, and the pupil color was sepia. Bills and talons were black, and ceres, legs and feet yellow. The down was a dirty-white color with a faint beige tint above.

On 11 May, one wk after the last young hatched, only three young were found in the nest. The youngest nestling had disappeared. The remaining nestlings were now in second down, which was markedly denser and showed a slight ochre shading above. Two years earlier, on 14 May 1981, I found three nestlings in the same plumage state in this nest. On 18 May 1983 the nestlings were aged approximately 15–19-d-old. The down of the nestlings was dense and colored dirty greyish-white with an ochre tint. The tips of the first feathers were showing through

the skin on the back of the largest nestling. Iris color was dark brown and pupil color was dark grey-blue.

Rectrices, remiges, wing coverts and back feathering were showing on 21 May, and on 25 May (22–26 d post-hatch) already formed dark bands (Fig. 3). However, feathers had barely sprouted in the smallest nestling.

The nestlings had grown remarkably by 2 June (approximately 30–34-d-old) and were fully clad with feathers (Fig. 4). Iris color was a brownish yellow-grey. Back, wings and underparts were colored a chestnut brown.

When the nest was approached on 18 June the nestlings began to disperse, walking and flapping across the rock face. On 21 June the nestlings had left the nest and were calling from the cliffs nearby as one adult circled overhead. On 22 June only one fledgling was seen near the nest (T. Michev, pers. comm.). The fledgling remained at the nest-site for approximately 46–50 d and was flying at approximately 49–53 d.





Figure 2. Recently hatched chicks of the Long-legged Buzzard, and one "chipping" egg. Note Weasel as prey item in the nest.

**Behavior of Young.** On 4 May 1983, the date the last nestling hatched, the brood were extremely "tottery" and lay with their heads resting on the nest. The nestlings often fell sideways when attempting to move. The two larger nestlings made pecking movements at each other's bills, whilst fast movement of a human hand was required to induce



Figure 3. Chicks of the Long-legged Buzzard at approximately 22-26-d-old, lying "frozen" on the nest as if dead.



Figure 4. Chicks of the Long-legged Buzzard at approximately 30-34-d-old in "defensive" posture.

the larger of the nestlings to raise its head, call and open its bill. On 11 May the three nestlings (approximately 8-12-d-old) moved restlessly about the nest, calling at intervals. The nestlings panted with their bills ajar in the hot, midday sun, and the smallest nestling tried to take shelter beneath a large leaf overhanging one corner of the nest, as well as behind its largest sibling. The nestlings made no reaction to me reaching out to pick them up but glanced regularly skyward. The largest nestling was in "frozen" posture with its left foot on a small rodent (*Microtus* sp.) which had been eviscerated. Based on this evidence, the nestlings were already attempting to feed themselves on prey brought to the nest.

On 18 May I found the nestlings (approximately 15-19-d-old) lying motionless as if dead, a common behavior in western North American buteos (C. M. White, pers. comm.). Heads were pressed against the nest, and the nestlings were utterly silent and remained so even when I moved them with my hand.

Only the largest pecked at my hand. The nestlings remained still throughout my 15 min stay at the nest, although each moved their heads to follow the overhead flights of Jackdaws (*Corvus monedula*).

On 25 May the nestlings (approximately 22–26-d-old) lay “frozen” on the nest and remained silent, whereas eight d later on 2 June the nestlings moved quickly to one corner of the nest when I approached, and assumed a defensive posture. Wings were held out, and my hand was attacked with bill and talons. The two smaller nestlings lay on their backs, bills wide ajar, but attacked only with their talons. Similar behavior was shown by two well-feathered nestlings on 13 June at the 1982 nest.

On 4 June 1981 I watched the reaction of 28-d-old nestlings at the arrival of an adult with prey from a hide 25 m away. The nestlings uttered soft cheeps while the parent circled overhead. The nestlings grew quieter as the adult alighted but reached maximum intensity as the adult began feeding the young. Sometimes the adult left before the prey had been completely eaten by the nestlings, at which time the larger ones would attempt to feed themselves; the nestlings managed to do so competently at approximately four wk old.

**Food.** On sunny days the main prey was Green Lizards (*Lacerta viridis*) of different sizes. The following prey items were found on the nest: (1 May 1983) two Green Lizards and one Common Vole (*Microtus arvalis*); (4 May 1983) one Sibling Vole (*Microtus subarvalis*), one Weasel (*Mustela nivalis*) and one Green Lizard; (11 May 1983) one Common Vole and two Green Lizards. Lizards had fractured skulls or were beheaded, and the Weasel had fractured neck vertebrae.

**Behavior of Adults.** Incubation began in early April (on 9 April 1981 an adult was sitting on the nest) and ended in early May (see above) and was performed chiefly by what was presumed to be the female, relieved by its mate for brief periods only, mostly in the early afternoon. The non-incubating adult spent much of the day close to the nest site perched either on rocks where it also roosted, or on the ground. During sunny weather, mostly between 1500–1600 H, the incubating bird would rise from the eggs and stand for a few minutes on the rim of the nest. The adult would then turn the eggs with its bill and settle on them once again.

Normally at nest-relief the incoming adult carried prey, usually a small rodent. Several times I watched an interesting nest-relief ritual. The incoming adult held the prey by the tail in its bill and swung the

prey, pendulum-like, in front of its incubating mate before finally dropping the prey onto the nest. The incubating adult then rose, swallowed the prey and flew away from the nest, and the relieving adult settled to incubate.

One adult, presumably the female, was almost constantly in attendance at the nest during the first week after hatch. Later, food was brought to the nestlings by both parents. During 10-hr watches on 11 and 21 May 1983 at a distance of approximately 800 m from the Pekliuka nest, adults brought in food 13 and 21 times, respectively. Prey was carried in the talons, rarely in the bill. While nestlings were still downy, the prey was fed piecemeal to the brood by the adults. Prey larger than voles (*Microtus* sp.) was fed by the adults even after the nestlings were well grown.

People, chiefly herdsmen, entered the nesting territory frequently. The buzzards displayed extraordinary wariness in their approach to the nest whenever human presence was detected. The buzzards circled and glided to and fro at relatively low altitude, often dropping to the ground. Only when the cause of the disturbance had left the area would one of the pair land at the nest, sometimes remaining on the nest rim for  $\leq 15$  min, totally still, before attending to the nestlings. If the adults noticed human approach early in the season when transporting nest material, or while carrying green boughs to lay on the nest beside the nestlings, the material was immediately dropped in flight and the adults left the area. Adults in flight would attempt to drop food onto the nest from a height of 2–4 m in response to distant activities of herdsmen. Incubating adults left the nest when I approached in full view within 150–200 m from the nest, but flushed when I came within 30–40 m to the nest from around the base of the cliff.

Generally, the pair would circle 50–60 m above the cliff and call, but when I visited the nest between 1–4 May 1983 at the time of the hatch, the adults flew about and called loudly and anxiously. When I stood one m from the nest, the adults began diving at me with partly closed wings, making rushing sounds like falling rocks. The dives were made from a height of 30–35 m and were repeated several times, ending 8–10 m above my head. The “attack” of the adults was most aggressive on 11 May 1983, when one adult, probably the male, was much the bolder and came within a few meters of me. One of the adults dove at me and dropped a Green Lizard “missile-fashion,” which landed a few meters from me.



On later visits the pair was less noisy and aggressive. Usually their high circling above the nest was short-lived, and the adults would disappear from view. One adult did show itself as I retreated from the area.

**Vocalisations.** Before and during feeding, downy young uttered cheeps like young domestic fowl (Pekliuka—4 June 1981). When nests were visited which contained young, adults uttered calls resembling those of the Common Buzzard (*Buteo buteo*) but louder and more shrill.

**Nest Adornment.** After the hatch, I almost invariably found sprays of greenery lying on the edge of the nest cup. Though wilted and trodden by the young, the sprays had apparently been fresh when brought by the adults. I found flowering or leafy boughs ( $\leq 6.5$  mm dia) of the following: apricot (*Prunus armeniaca*) on 14 May 1981; common pear (*Pyrus communis*) and wild rose (*Rosa* sp.) on 4 May 1983; eastern hornbeam (*Carpinus orientalis*) on 11 May 1983; and willow (*Salix* sp.) on 18 and 25 May 1983.

#### DISCUSSION

Despite the smallness of the study sample, the relative dearth of published information on the Long-legged Buzzard's breeding cycle justifies comparison of my findings with data in print. Nests in Bulgaria are almost invariably on cliffs. Most of the 14 nests reported by Michev et al. (1984) and all the nests reported in this study were within 500 m of moving or standing water. Numbers and variety of small and medium-sized prey may thus be greater in the vicinity of water. Diameter of both nests in this study is somewhat smaller than the average value (70 m) reported by Dementiev and Gladkov (1954) for the Soviet Union.

Dimensions of two eggs measured in this study, and the values of 60.3–63.1 mm  $\times$  45.4–50.0 mm for eight eggs reported by Michev et al. (1984), are within the range reported by Cramp and Simmons (1980) but are closest to the mean for 10 eggs from Greece recorded by Makatsch (1974). The indication here is that egg dimension is uniform within the Balkan population of Long-legged Buzzards. The most common clutch size in this study was four eggs, which agrees with the findings of Dementiev and Gladkov (1954) and Michev et al. (1984).

Only three of the four eggs at each of the two nests observed in this study gave rise to flying young. The last young to hatch of the Common Buzzard

often dies through inability to compete for food with its larger siblings (Mebs 1964). On my visits to the Pekliuka nest both during and after hatching, uneaten prey was present on the nest rim, and watches from hides suggested that adults had little difficulty in securing prey. Clearly, further research is needed here. Cramp and Simmons (1980) suggest a fledging period for Long-legged Buzzards of "c. 40–42 days or more," a figure markedly exceeded by the approximate 49–53 d fledging period recorded at Pekliuka.

Michev et al. (1984) found remains of eight prey species (14 items) in pellets collected near a Bulgarian nest of Long-legged Buzzards. Two prey species, the Water Rat (*Arvicola terrestris*) and the Lesser Mole Rat (*Spalax leucodon*), were new to the spectrum of prey for the species as given in Cramp and Simmons (1980). Nine prey items of four species were found on the Pekliuka nest, of which the Weasel and Sibling Vole were new prey species to the buzzard's recorded diet in Bulgaria. Numerous Green Lizards were carried to nests in this study during sunny weather and in the study of Michev et al. (1984). Recorded prey items varied at both sites, but a preponderance of species made vulnerable by basking habits was shown. European Susliks (*Citellus citellus*) figured importantly in the diet of Long-legged Buzzards at another Bulgarian site (Michev et al. 1984).

Cramp and Simmons (1980) did not report on the role of the sexes during incubation. The brief incubation duty undertaken by what was presumed to be the male at the Pekliuka nest site reflects the pattern given for the Common Buzzard (Cramp and Simmons 1980). The nest-relief ritual observed during my study has not been reported for either the Long-legged Buzzard or the Common Buzzard.

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